af

andalusite, and garnet, suggesting a possible prograde metamorphism. Just east of Sherwin Island, the migmatitic high grade rocks are severely sheared and retrogressively metamorphosed to sericite-chlorite phyllonites and other pervasively sheared rocks. Contains chips, fragments, blocks, and slabs of allochthonous light grayish-green to dark green, polyfoliated antigorite, serpentinite and associated chlorite-actinolite-epidote schist, talc-chlorite schist and epidote-chlorite-actinolite schist (um), as well as intrusive sills

of fine- to coarse-grained, greenish-gray metadiabase (am).

dg Artificial fill Disturbed ground Contact Mainly abandoned sand and gravel pits; includes fine-grained Various materials; mainly under roads, railroads and Dotted where concealed. Distribution and congraded cut and fill areas such as airfields and landfills. sediments in pond fills near gravel washing plants. centration of structural symbols indicates degree of reliability. Qa1 Alluvium High angle fault Dotted where concealed Sand, gravel, silt, and clay in fairly well sorted and bedded fluvial deposits in modern flood plains and marshes; as much as 20ft thick. Inclined Overturned Thrust fault and subaqueous slide Dotted where concealed. Sawteeth on upper plate Qt Where overturned, sawteeth in direction of dip; Terrace deposits barb on side of tectonically higher plate. Gravel, sand, silt, and clay in areally restricted bedded fluvial deposits bordering modern flood plains; 10 to 25ft thick. Small fault seen in outcrop, showing dip Early fold showing bearing and plunge UNCONFORMITY MINOR FOLD AXES Qte3 **→**65 Ote Ote2 Early fold showing bearing and plunge Qtel 25 Terrace and estuarine deposits Asymmetric fold, showing bearing and plunge and Silt, clay, sand, and gravel in well bedded, fairly well sorted rotation sense as viewed in profile. interfingering deposits locally containing peat and shelly layers; ancestral Potomac River deposits filling large valleys cut into Cretaceous deposits; upper layers locally crop out in wave-cut PLANAR FEATURES cliffs and stream-cut terraces. Qte 3, in low plains that border the Potomac Estuary at elevation of 5 to 10ft; base as much as 80ft below sea level; mainly medium-to coarse-grained sand and gravel; possibly Wisconsinan. Inclined Overturned Vertical Qte 2, widely distributed upward-fining clastic deposits beneath fairly flat plain at elevation of 35 to 45ft; base as much as 100ft below sea level; Early to Middle Sangamonian.

Qte 1, locally preserved at Mason Neck where top of unit 60 to 80ft Strike and dip of beds Ball indicates top known from sedimentary structures above sea level and base is below sea level; mainly fine-grained Cc sand; possibly Early Sangamonian. Colluvium Strike and dip of layering in mafic igneous rocks Angular pebble, cobble, and boulder gravel in unsorted matrix of clay, silt, and sand; forms hillside veneer and local slump deposits as much as 20ft thick; includes lag gravels 10 to 20ft | UNCONFORMITY 50 thick capping saprolite on crystalline rocks. Inclined Vertical Ct 4 Strike and dip of foliation in metaigneous rocks and schistosity of intermediate generation in Ct 2 metasedimentary rocks. Ct 1 Dissected terrace deposits 45 Well-rounded cobble and pebble gravel, quartzose sand, inter-bedded with minor layers of silt and kaolinite clay; in Inclined Vertical Strike and dip of first generation schistosity stratified fluvial deposits about 30ft thick on broad nearly flat uplands that descend step-like from an elevation of about 500 ft to about 120 ft near the Potomac Estuary. Ct 5, nearly flat-topped terrace deposits of sand and gravel, remnants Inclined Vertical of an ancestral Potomac River from 100 to 140ft; overlies Cretaceous Strike and dip of strain-slip cleavage and schistosity Ct 4, nearly flat-topped remnants of an ancestral Potomac River at elevations from 170 to 190ft; gravel-bearing cut and fill structures common; overlies Cretaceous strata. Ct 3, widespread sheet-like deposits of mainly unweathered gray gravel Strike and dip of fracture cleavage and sand forming a nearly level upland terrace at 220 to 250ft; overlies saprolite on the west but overlaps contact of wedge-edge of Cretaceous Coastal Plain strata at the Fall Line. Probably deposited by an ancestral Potomac River. Ct 2, dissected terrace-like remnant of brown-red gravel and sand at Inclined Vertical elevations from 320 to 380ft; overlies saprolite. Strike and dip of essentially parallel bedding and schistosity Ct 1, an outlying erosional remnant, is the oldest and highest level deposit present at elevations from 450 to 520ft; reddish-brown, deeply weathered, with quartzite cobbles within 10ft of the surface that readily disintegrate; unconformable on thick saprolite overlying crystalline rocks. Contains silicified logs (<u>Taxodium</u> sp.) of Hattontown late Tertiary, probably Miocene age. LINEAR FEATURES UNCONFORMITY →55 Bearing and plunge of mineral lineation Kps <del>→</del> 25 Bearing and plunge of intersection of bedding Kps and schistosity Potomac Formation Bearing and plunge of crenulations Varicolored clay and silt interbedded with sand, pebbly-sand, Airpor and gravel in fairly well bedded, interfingering fluviatile deposits as much as 600ft. thick. Unit spans a time range from Barremian to Albian and contains dated flora of Brenner Bearing and plunge of quartz rods Pollen Zones I and IIa; equivalent to Potomac Group of Maryland, but formations present there cannot be subdivided in this area JOINTS due to regional facies changes and wedge-outs. Unit unconformably overlies saprolite on crystalline rocks. Kpc, Potomac clay facies- predominantly red-brown, green and gray silty and sandy clay with minor lenticular sands; locally pyritic, Inclined Vertical carbonaceous and pollen-bearing; clay has high shrink-swell char-Strike and dip of joints acteristics due to predominance of montmorillonite (smectite);includes landslide and slump deposits (not mapped) on steep to moderate slopes; mainly fluvial overbank deposits.

Kps, Potomac sand facies- predominantly buff to gray, fine- to coarsegrained pebbly feldspathic sands with minor lenticular clay and silt beds; thick- bedded to massive units commonly coarse grained, cross-KPP bedded, contain clay galls, and fill erosional channels grading abruptly to finer-grained sand of point bar origin and overbank silts UNCONFORMITY JT₄ d Diabase Fine-to-coarse-crystalline dark gray intrusive igneous rock composed of an interlocking mosaic of labradorite and augite with minor olivine, epidote, pyrite, magnetite, ilmenite and zeolites; occurs as dikes, sills, and stocks; probably Lower Jurassic age. Frossroads k mr & Newark Group JT tm, Thermally metamorphosed Triassic rocks in contact with intrusive diabase; formerly siltstone, sandstone, shale, and conglomerate now baked, indurated, and converted to bluish-gray, black, and mauve hornfels, in part spotted with abundant epidote, andalusite, corderite, chlorite; locally contains pyrite, magnetite, sphalerite, and copper minerals. Thermal effects diminish gradually away from diabase, but baked halo of brittle rocks commonly as much as 1000ft wide. JR bf, Bull Run Formation- a heterogeneous assemblage of interbedded brickred shale, red-brown siltstone, and feldspathic sandstone. Only a few hundred feet of this unit crop out in the county, but it is very extensive to the west, where it contains Lower Jurassic fossils.

To bb, Balls Bluff Siltstone- predominantly platy, reddish-brown, micaceous, calcareous, sandy siltstone interbedded with fine-grained, calcareous, feldspathic sandstone and laminated, dark red, silty shale. The unit is believed to be fluvio-lacustrine (playa lake?) in origin, locally contains carbonaceous plant material and plant impressions, and may exceed 6000ft in thickness; it grades laterally and vertically into both underlying and overlying units. Two, Manassas sandstone- mainly reddish-brown, micaceous, very fine-to coarse-grained, thick bedded, locally crossbedded arkose; locally contains sandy, micaceous, calcareous siltstone interbeds; coarse-grained sands commonly pebbly and conglomeratic. The unit is predominantly fluvial in origin, exceeds 2000ft in thickness, and interfingers laterally and vertically with calcareous siltstone. mr, Reston Member of Manassas sandstone- predominantly pebble to boulder conglomerate with subangular clasts of schist, quartz, and quartzite in a matrix of fine-to coarse-grained arkosic sand or clayey silt. Usually deeply weathered, loose or friable at the surface Centervill but compact at depth. In places contains beds of micaceous, calcareous, clayey, and feldspathic siltstone, fine-to medium-grained crossbedded arkosic sandstone, as well as pebbly feldspathic coarse-grained sand. The unit is apparently a fluvial fan deposit and averages about 70ft in thickness; it rests unconformably on saprolite formed on schist and greenstone and grades laterally and vertically to feldspathic sandstone UNCONFORMITY Forner METAMORPHOSED SEDIMENTARY AND IGNEOUS ROCKS These rocks occur in six different lithotectonic units that are separated by either a tectonic contact, an igneous body, or an unconformity. Therefore, the relative ages of the units cannot be directly established other than that the metasiltstone-phyllite is younger than the Piney Branch allochthon, the Potomac River allochthon, the Sykesville Formation, and the Eastern Fairfax (autochthonous?) sequence, and that the Sykesville Formation is younger than rocks of the Piney Branch and Potomac River allochthons and Eastern Fairfax sequence. The tectonic stacking order of these lithotectonic units is given Metasiltstone-Phyllite Sequence UNCONFORMITY Piney Branch Allochthon \_ \_ \_ \_ \_ Sykesville Formation \_ \_ \_ \_ \_ \_ Eastern Fairfax (Autochthonous?) Sequence INTRUSIVE ROCKS The relative ages of these rocks are uncertain Lenticular bodies or irregular masses of quartz, some bodies are foliated or polyfoliated, whereas others are massive. The quartz is likely of more than Fine-grained, dark-greenish-gray, biotite quartz-plagioclase lamprophyre. Tonalite and related rocks Granitoid Complex Medium-to coarse-grained light-to medium-gray, biotite-hornblende metatonalite, Medium- to coarse-grained, light-gray, muscovite-biotite metaadamellite Area thought to be underlain by granitic rocks on basis of geophysics and lesser metagranodiorite. Northern part of Occoquan batholith is metatonalite containing few to abundant inclusions of more mafic igneous biotite metatonalite, muscovite-biotite metatonalite, garnetiferous muscoviteand limited soil data. The degree of confidence in this interpretation biotite metatonalite, and muscovite-biotite metagranodiorite (gd mb). At many is not great. Rock in the south along Holmes Run and in the southeastern rock and metasedimentary rock. Rock at most places has two foliations places contains abundant inclusions of more mafic igneous rock and at other part of the body along Tripps Run is identical to the metatonalite (t) and a strong quartz rod lineation. Rock along north border is crushed, places foliated metagraywacke (bg). Rock is foliated and in many exposures has mapped elsewhere. Rock in the Falls Church quarry is metatrondhjemite (tr) a quartz rod lineation; may be related to the Occoquan batholith; clearly intrudes deformed graywacke (bg) and pelitic schist (as), but an intrusive rewhereas that along the contacts in the south has a strong cataclastic foliation. It is possible that tonalite in the north is an earlier intrusion and that the Occoquan batholith is composite. Contains small lation to the Sykesville Formation (d) cannot be proved. At one place it apbodies of light-gray, fine-grained adamellite porphyry (oap) and mafic pears to contain an inclusion of muscovite metaadamellite (ma). seggregations (oam). Muscovite adamellite Very light-gray to pink, foliated, medium-grained muscovite metaadamellite. Rock locally has a pegmatite phase. Unit clearly intrudes pelitic schist (as) and one small body appears to have chilled contacts against Sykesville Bear Island Granodiorite Fine- grained, very light-gray, biotite-muscovite adamellite to granodiorite aplite (ap) and lesser related pegmatite. Rock forms small-to moderate-sized sheets and cross-cutting bodies. Found only within the Peters Creek Schist. METASEDIMENTARY, METAVOLCANIC, AND TRANSPORTED INTRUSIVE ROCKS Metasiltstone and phyllite Medium- to very fine-grained, light-gray, brown-weathering, micaceous metasiltstone (phs) and light-gray, brown-weathering phyllite (php).
These two units are interbedded and contain the typical mineral assemblage magnetite-biotite-muscovite-plagioclase-quartz (-chlorite-epidote). Both units contain fairly abundant felsic and mafic tuff. Common graded bedding in metasiltstone (phs), in addition to other sedimentary features, suggest deposition as a distal turbidite. These two units have a prominent cleavage related to isoclinal folding; later refolding rarely has produced a second cleavage. Both units have undergone a single low grade metamorphism and the only evidence of retrogression is slight chloritization of some biotite. UNCONFORMITY POTOMAC RIVER ALLOCHTHON PINEY BRANCH ALLOCHTHON QUANTICO SYNCLINE SEQUENCE EASTERN FAIRFAX (AUTOCHTHONOUS ?) SEQUENCE These rocks are considered to be possibly autochthonous because they appear to underlie the Sykesville Formation am Piney Branch Complex Sykesville Formation Peters Creek Schist Intermixed complex of subequal parts of peridotite, pyroxenite, and gabbro now represented by serpentinite, soapstone,actinolite Quantico Slate Light- to medium-gray, medium-grained chlorite-biotite-muscovite-plagioclase-quartz granofels (d) which is locally garnetiferous. schist, and amphibolite. Contains small dikes and sheets of Fine- to coarse- grained, lustrous, greenish-gray to gray, reddish-Metagraywacke and pelitic schist brown weathering, quartz-rich phyllite, schist, and mica Dark-gray to black, carbonaceous slate containing thin to thick graded Unit is characterized by chips, fragments, blocks, and slabs of Light-to medium-gray, fine-to medium-grained metagraywacke (bg). Part of gneiss (mp). Fine- to medium-grained, light- to medium-gray beds of metamorphosed quartz sandstone and siltstone (qsu) grading down into dark-gray to black slate having abundant interbeds of light-to medthe unit is either well-bedded and graded or laminated. The remainder is a quartzofeldspathic granofels, which contains a high percentage of volreddish-brown weathering, semipelitic schist and gneiss (msp). Finequartz, as well as allochthonous Peters Creek Schist (mp), pelitic to medium-grained, light- to medium-gray, yellowish-to reddishschist (as), metagraywacke (bg), serpentinite or soapstone (um), ium-gray volcaniclastic metamorphosed mudstone and medium-gray volcanimetagabbro (gb), undifferentiated mafic and ultramafic rock (m/um), and other unmapped exotic rocks. There are probably many more allochthonous fragments than mapped, but they cannot be seen because of brown weathering, well bedded metagraywacke (mg). Each of these caniclastic material. Unit contains interbeds of pelitic schist (as). A clastic phyllite (qsl). Unit has many mesoscopic reclined folds. units contains abundant interbeds of each of the other rock types typical mineral assemblage is biotite-muscovite-plagioclase-quartz (-garas well as thin layers of calc-silicate rock. Much of the gray-wacke is graded, but some beds are laminated. These rocks are net-chlorite-epidote-magnetite). Unit appears to underlie the Sykesville poor exposure. In addition, the mélange contains small to large blocks Yorkshire Formation Formation (d), but does not grade into it. of tonalite. No inclusions of mélange are seen within the tonalite, rhythmically interbedded and have all the characteristics of nor is there any other evidence of intrusion. The tonalite, therefore, is considered to be allochthonous. The unit shows the effect of a single flysch deposits. The more pelitic rocks best reflect a progressive Light-gray, brown-weathering, fine-to medium-grained biotite-chlorite-quartz-muscovite schist (as). Rock differs from more pelitic rock (mp) Dark-colored, quartz-plagioclase-chlorite granofels containing Chopawamsic Formation metamorphism from west to east having the following typical mineral chips, fragments, and small blocks of quartz, serpentinite, amphibolite, plagiogranite, mafic volcanic, and other exotic prograde( garnet) metamorphism. assemblages: muscovite-chlorite-quartz (plagioclase-magnetite), Grayish-green, fine- to medium-grained, chlorite-epidote-biotite-muscoviteof Peters Creek Schist in that it contains much less quartz, has quartz chlorite- biotite-muscovite-quartz (-garnet-plagioclase-magnetite), garnet-staurolite- andalusite-plagioclase-biotite-muscovite-quartz rock types. The melange is characterized by abundant light-colored feldspar grains that contrast markedly with the quartz plagioclase gneiss grading into greenschist. These rocks are probably distributed uniformly throughout the phyllosilicates rather than conmixtures of intermediate and mafic volcaniclastic material with material of centrated in rhythmic layers, and lacks segregation viens which are common in the Peters Creek. A typical mineral assemblage in the unit (-magnetite), kyanite-garnet-plagioclase-muscovite-quartz (-magnetite) dark-colored phyllosilicate component, and by a scaly foliation. part of formation contains beds of felsic, interand sillimanite-biotite-microcline-plagioclase-quartz (-magnetite). mediate, and mafic tuff as well as some mafic flow rock and volcanic breccia. is biotite-chlorite-quartz-muscovite (-garnet-plagioclase-epidote-About coincident with the appearance of sillimanite, the rocks Unit grades up into the Quantico Slate, the contact being placed at the first magnetite). Garnet is sporadic. The schist, which appears to underlie become migmatite. The high grade index minerals are commonly altered the metagraywacke unit (bg), is the same metamorphic grade throughout appearance of dark-gray to black, carbonaceous slate. to shimmer aggregate. At several places, chloritoid and coarse its area and shows the effect of a single prograde (garnet) metamorphism. muscovite form at the expense of shimmer aggregate after staurolite,